UNIVERSITI TEKNOLOGI MARA

ANTAGONISTIC ACTIVITY OF SELECTED BACTERIA AGAINST *Colletotrichum gloeosporioides* IN HARUMANIS MANGO

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with Academin Rules and Regulation for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Harumanis mango is one of the most popular fruits in Malaysia and has excellent potential as an export crop. The major pre and postharvest disease of mango is anthracnose, caused by the fungus *C. gloeosporioides*. Synthetic fungicides are commonly used to reduce losses from anthracnose disease. However, their use gradually become more restricted due to public concern over toxic residues. The aims of this study were to isolate the causal agent of antracnose and the antagonistic bacteria from the Harumanis mango, determine the antagonist activity of antagonist bacteria towards *C. gloeosporioides in vitro,* identifying the pathogen and the antagonist bacteria by 16S rDNA and screening the antifungal compounds produced by the antagonist bacteria. Twelve bacterial isolates were initially selected from 96 isolates tested which showed inhibitory effects against *C. gloeosporioides* on Potato Dextrose Agar (PDA). The mean PIRG (%) of the twelve potential bacterial antagonists were tested using Minitab statistical analysis software which showed that there was a significant difference in mean PIRG (%) with a ratio of 76.81 and an associated p-value of 0.000. Out of the twelve tested bacteria, two isolates, BT12 and BT09 had a significantly higher antagonistic activity against *C. gloeosporioides*. By using the 16S rRNA technique, isolates BT12 and BT09 were identified as *Pseudomonas aeruginosa* and *Bacillus subtilis* while the causal agent of Harumanis mango anthranose was identified as *C. gloeosporioides*. Both *P. aeruginosa* and *B. subtilis* strongly inhibited the fungal growth by an average of 58.82% and 52.55% and rated at scale 3 using the growth inhibition scale (GIC). Malformation of the fungal hyphae occurred in the presence of both bacteria which were viewed under light microscopy (LM) and scanning electron microscopy (SEM). Varying degrees of antagonistic effects occurred in the dual culture assay which included the production of antifungal compounds by the antagonist bacteria. The compounds were screened by gas chromatography mass spectrometry (GC-MS). Results indicated that *P. aeruginosa* and *B. subtilis* produced antibiotics such as Pyrrolo [1, 2-a] pyrazine-1, 4-dion, hexahydro-, Propanoic acid and Cylohexane, (1, 1-dymethylprophyl) which are responsible for the inhibition of fungal growth. Therefore, *in vitro* activities of the *P. aeruginosa* and *B. subtilis* against *C. gloeosporioides* of Harumanis mango in this study suggested that the bacteria can be an effective biological control agent.

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